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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLIX
No. 1273

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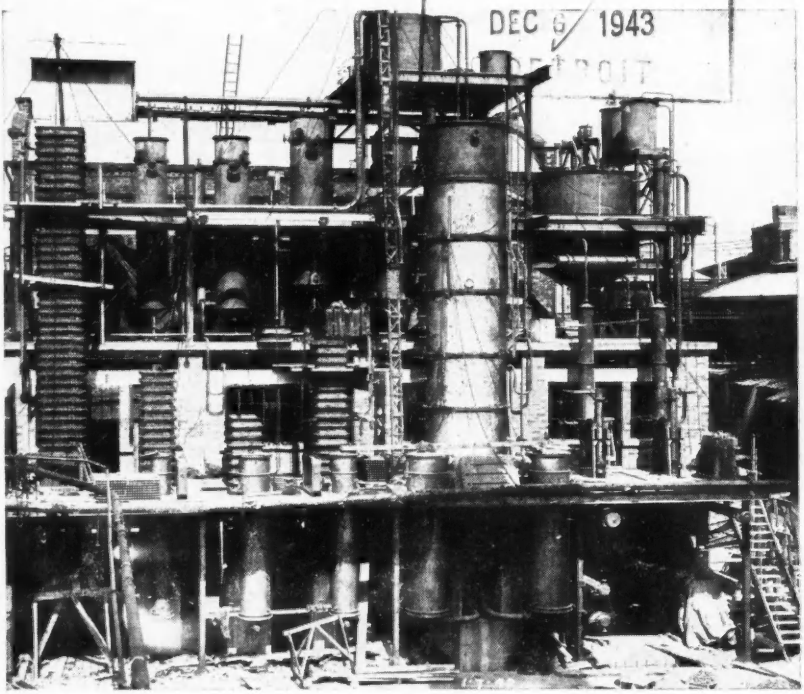

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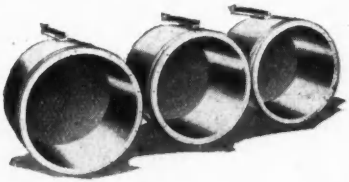

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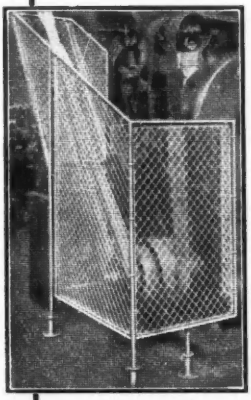

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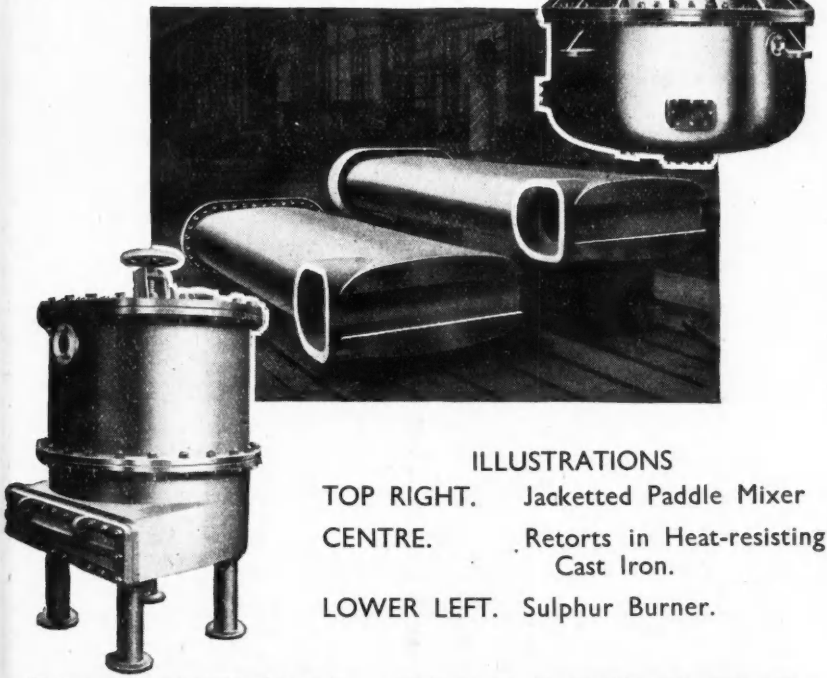

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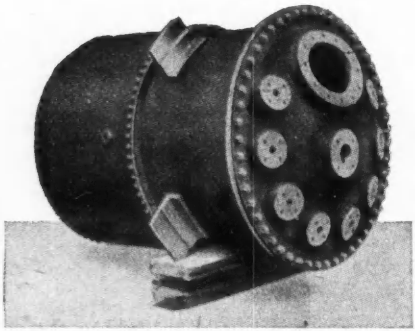

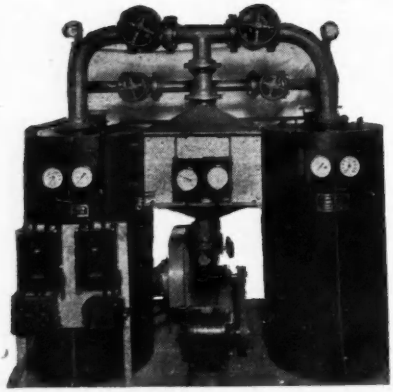

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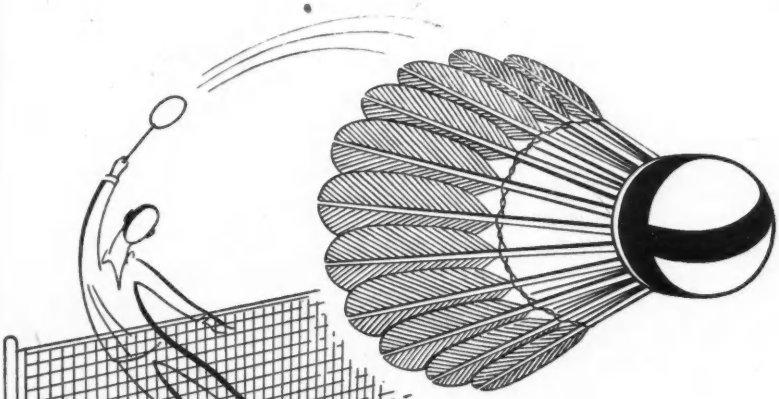

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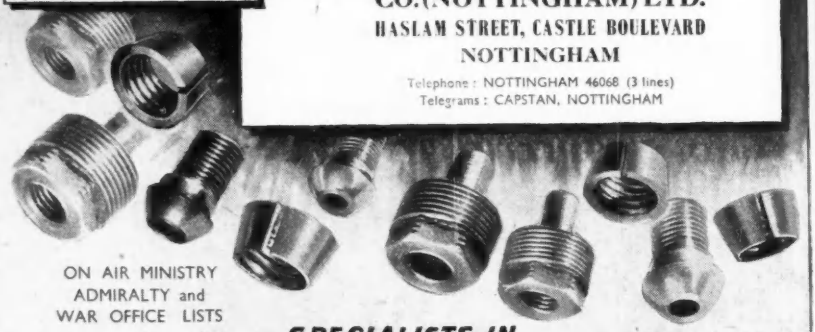

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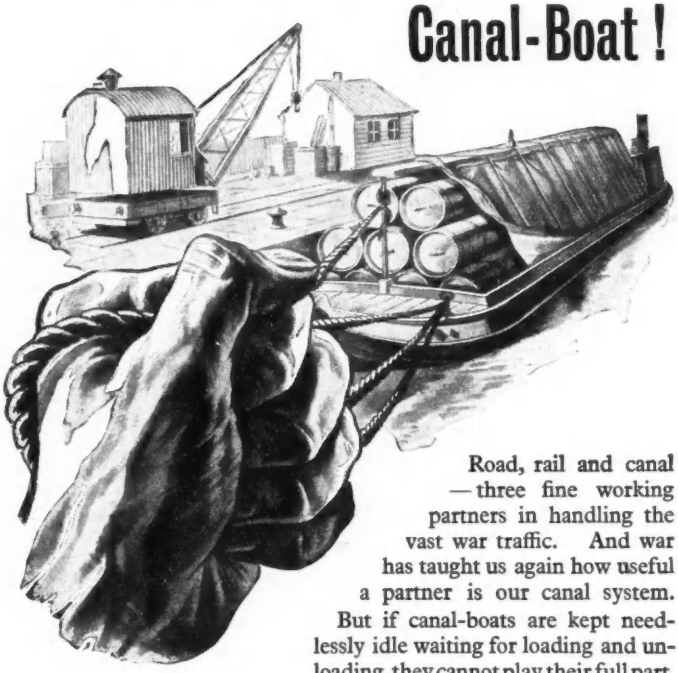

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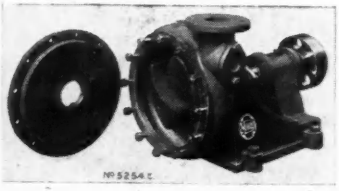

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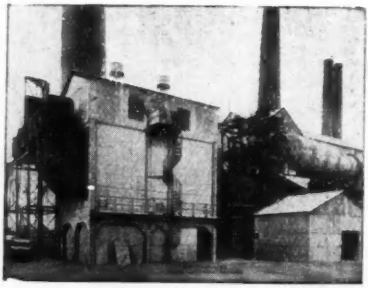

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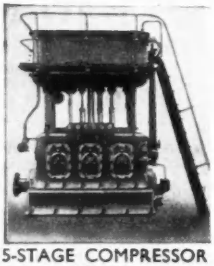

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Education of Chemical Assistants

MANY young people who have a flair for the practice of chemistry are forced by circumstances to enter a laboratory direct from school. In the laboratory they find themselves in an atmosphere, utterly different from that of their previous surroundings, in which their work is restricted as a rule to the performance of comparatively few analytical operations for which directions are given them amounting to something like the recipes in a cookery book. Of instruction there is none, other than what is required to enable them to perform such duties as they may be given with sufficient accuracy. They gain a certain manipulative experience, they are taught that time is the essence of industrial operations and that the leisurely methods of the school laboratory, with its slipshod ways, cannot be tolerated in the works laboratory. That is a positive gain. The school laboratory, in which many students are taken in one class, works to an examination syllabus, and must get through its syllabus in time for that examination to be taken. Thus, two or three pupils are set to work on one experiment, which they may or may not understand, and so long as a result of some sort is produced, accuracy does not matter. There is no time to repeat an experiment; and even though some have not grasped it, the examination time-table demands that the class shall pass on to the next. Thus, the scholar finds himself at a disadvantage; but this particular disadvantage is removed by the insistence upon accuracy in the works laboratory. What is imposed in its place is the disability of complete cessation of instruction. The laboratory assistant, surrounded by people who have secured their degrees, and who are sometimes impatient of those who have less knowledge than themselves, must find other methods of fitting himself for his career, and those methods must generally involve spare-time work. Thus, the neophyte who enters a laboratory direct from school finds that instead of enjoying his leisure, he must spend his days in earning his living and his nights in toil in order that at some future time he may attain to the dignity of a "qualification," and speak with his contemporaries on equal terms. By the time his objective is achieved, he is often too old to enjoy the leisure that he has; "God gives us nuts," says the old Spanish proverb, "when we no longer have teeth to crack them."

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Many of our readers will remember the sad case recorded in our columns on October 2 (p. 328) of a girl who entered industrial employment in these conditions, and who was only allowed time off to attend evening classes by working additional hours during the day.

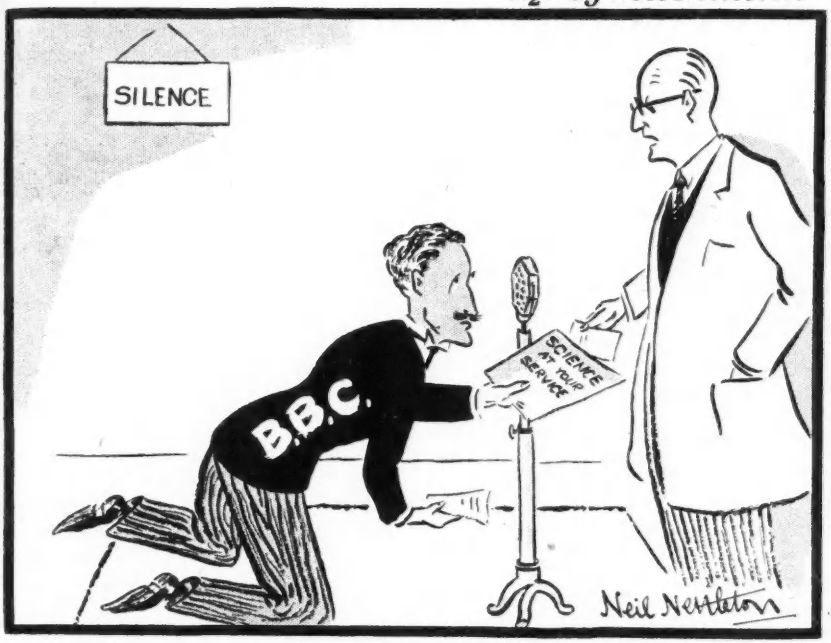
Two things benefit both the individual and the firm that employs him: (1) that he shall be in the best of health, and (2) that his brain shall be developed to its highest potential. This is not an "either/or" condition; both conditions must be present simultaneously. No firm can afford to let its employees ruin their health in order to equip themselves for their job. Thus it is to the advantage of firms to weigh increase of knowledge against hours of work and to strike a balance. The principle of allowing an employee to be trained in the firm's time is becoming widely adopted, especially in the larger undertakings, and is not confined to the black-coated, or white-smocked, staff. It is not more generally adopted for two main reasons. One is that the firm takes the view that it employs a man to do certain work, and cannot afford to allow him to be absent from his work or it would not be done. To get additional help is held to be too expensive. The second reason is that there is every likelihood that when the youth is better trained he will go away and get a better job, and thus the firm will in effect have trained him in their own time, and, to some extent at all events, at their expense for someone else.

To raise these objections is to condemn oneself out of one's own mouth. Any firm that takes these views is clearly not worth working for from the employee's angle. Either the firm is so "shaky" that it cannot afford the smallest additional expenditure, or it is so cheese-paring in its methods that the likelihood of securing a better position is remote. It is very rare indeed that arrangements cannot be made to enable employees to take certain time off for training. If these employees are such as will benefit by their training, the firm will reap the reward, and the employee is likely to be able to work faster to make up for the hours spent in education. If the firm fears that an employee will leave as soon as trained, it is evident that there can be no inducement to stay: the modern technique of management takes full account of the wishes of the individual. If an individual desires to "get on" in the world, means can always be found to make use of his services in a higher category. If a firm is well led, there is a loyalty among the employees which does not result in impulsive and unnecessary moves. Experience shows that labour turnover can be checked by paying attention to leadership and by improving the amenities of work. That is a point which has perhaps been less studied here than in the U.S.A.

Experience gained in control of laboratories and technical departments has shown that though a certain amount of wastage must occur among the younger generation who are allowed time off to continue their studies, the additional knowledge that they gain while staying with the firm far more than compensates for any losses due to wastage. In most cases the individuals who have made use of these facilities stay with the firm until they must be bluntly told that they can get no higher until someone leaves or dies. In smaller firms that must always happen at times, and the wise firm then begins to train a younger man as successor, and assists the older man, now too big for his job, to get a better one. In a well-managed firm it is common experience for the man thus trained to return, after a time away, to take a senior post, with added experience of other methods.

The problem must be studied on a national basis. It is a subject that Trade Associations might well examine. Many industries complain that they cannot find adequate staff of the right calibre—we refer to peace conditions, of course,—and training schemes have been instituted in some industries to attract the right raw material and turn it into the finished product required by the industry. This country will have need after the war of every trained man and woman it can muster. Those who are keen will be well worth training, and in instituting a system of part-time education firms will find what they are seeking. To those who look on the purely monetary aspect we would add that it is always more expensive to buy a finished article than to manufacture it from raw material: also the finished article may have to be re-moulded to fit.

N_2O by Neil Nettleton



Scientist (to Announcer): Even the mike you're using is a scientific instrument; so there's no need for *you* to apologise for *us*.

NOTES AND COMMENTS

Smoke Abolition

A GENERAL meeting of the National Smoke Abatement Society was held in London on Guy Fawkes Day—the "guy" being in this instance "Smoke," which the Society has for so long advocated should be burnt instead of being allowed to escape to pollute the atmosphere. The Society suffers somewhat from the very heterogeneity of its membership and supporters. Smoke prevention is a matter for the fuel technologist, a special subject for those who understand the problem of combustion, but by the nature of the case it is also a concern of the Medical Officer of Health, the Factory Authorities, the Architect, the Borough Engineer, and all sorts and conditions of people who make up a Town Council. The problem is one of increasing importance, and the rising tide of interest was evidenced by the fact that some 220 delegates from local authorities attended. It is evident that the Society has realised that in the spate of post-war planning now going on the smoke problem must not be forgotten. This problem has two angles: industrial and domestic. From the industrial side, the drive for better utilisation of fuel now being made by the Ministry of Fuel and Power will go far to solve the problem of smoke production. If fuel is burnt efficiently in well-designed appliances properly maintained in good order, smoke will not be produced. The domestic field is more difficult, because it is necessary to provide suitable smokeless fuel in quantity and to persuade people to use it. Acts of Parliament will be useless without the means to implement them. The conference was

reminded that smoke is not the only enemy; oxides of sulphur provide the attacking force for material damage; but the recovery of sulphur from power stations has pointed to the means for solving this problem. An important difficulty just now appears to be the emission of grit from war factories, a nuisance that has grown enormously. The Society's activities are worthy of keen support from all technologists.

Shortage of Post-War Scientists?

IF the many ambitious research schemes now being advocated are to materialise, it is imperative to take immediate steps to prevent a post-war shortage of scientists. This means that the facilities for scientific and technical education will need to be expanded with the least possible delay. The Government has made certain tentative proposals to this end. The scientific profession, which is best qualified to judge the adequacy of these proposals, does not appear satisfied with them. It is up to the scientific bodies to give practical expression to this dissatisfaction, by putting forward counter-proposals and pressing for their adoption. The Institute of Physics took this step many months ago. In the chemical world, a Chemistry Education Advisory Board has been set up to consider the problem, and we imagine that this body is now hard at work, though we have had no news of its activities since its establishment was announced. From the Association of Scientific Workers we have received an interesting memorandum on the recent Government White Paper on education. The Association's comments on the Government's proposals for continuation education are worthy of attention. The proposals are welcomed, but at the same time the Association expresses concern that continuation study is to begin with only one day per week and that the plans for part-time technical education are to be left on a purely voluntary basis, for review by industry and commerce.

Long-term Training Plans

THE A.Sc.W. has its own ideas on the training which should be available for young workers. It considers that there should be half-time day continuation schooling for those who leave school at the minimum age. Except for purely recreational purposes, evening classes should be abolished, as they represent one of the worst inequalities in our educational system. Adolescents should be under the care of the Board of Education up to the age of 18, and industry should be subject to inspection to ensure that working conditions and training schemes are satisfactory. To encourage young employees in their studies, such incentives as help with fees, travelling expenses and books should be given, as well as an increment of salary on the successful completion of the courses. Though written from the employee's point of view, many industrialists will find in this memorandum an endorsement of the schemes which far-sighted employers are already operating.

The Nuffield Scheme

IN this connection the long-term plan just announced by the Nuffield Organisation has considerable significance. This project includes free technical education and scholarships to the University. In outline, the education policy of the Nuffield Organisation is based on a regular intake into each factory of a number of approved apprentices who will be graded on performance and progress. To those who show most promise it is proposed to give scholarships to enable them to proceed to a University. Other apprentices will be encouraged to attend technical colleges and schools, and they will receive full wages for the time they spend in improving their education. During apprenticeship, wages are paid at a rate not less than the age-group standard laid down by the Engineering Employers' Federation. Another sound investment of this concern is the subsidising of midday meals for all persons under 18.

Nine American firms are expanding penicillin production. These companies are: Abbot Laboratories, Reichel Laboratories, Upjohn Company, Bayer Company (a division of Sterling Drug Company, Inc., manufacturing for Winthrop Chemical Company), Commercial Solvents Corporation, Eli Lilly & Co., Lederle Laboratories, Inc., Schenley Research Institute, and Cutter Laboratories. The total sum which will be spent upon the new projects exceeds $3,000,000.

Chilean Chemical Trade*

A Sketch of its Main Aspects

ONE of the chief reasons for the slow expansion of the chemical industry in Chile has been the relatively small, somewhat scattered population, with the resultant lack of a large home market. Another is the smallness of *all* manufacture, though this branch has experienced considerable progress in recent years. Only a comparatively small proportion of the population has an appreciation of the value of technical and scientific knowledge.

Rather at variance with this last statement, however—and an example of what may be accomplished—is the present manufacture of explosives in Chile. Chile has one of the largest high-explosive plants in South America and one of the largest black-powder mills in the world; here the reason for the development may be the large outlet already available, namely, the country's mining activities.

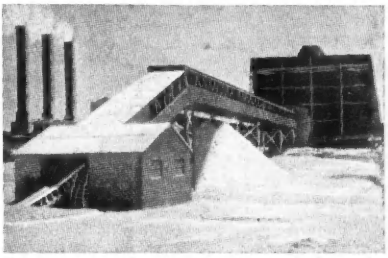
Mineral Wealth

Mining is Chile's chief source of wealth—particularly copper, lead, zinc, cobalt, iron, gold, silver, coal, and nitrates. Possession of these raw materials, especially copper and nitrates, has placed Chile in the forefront as a vital contributor to the war effort of the United Nations. Minerals account for more than three-fourths of the total value of all Chilean exports. In consequence of the record copper output, the value of Chile's mine production in 1942 probably exceeded the 1937 figure of $124,000,000. Ample coal deposits provide the basis for the establishment of a coal-tar industry. The country also abounds in forests, a source of future new wealth through chemical utilisation. Chile's fish resources are abundant and are being developed for food, and especially for oils and vitamins. This natural resource will be further and more adequately developed through the application of chemistry. The water power potential of Chile per head is second in the world only to Norway. This opens up great possibilities in the field of electro-chemistry.

Tartaric Acid

The grape industry has had a rapid growth, and in this field Chile now ranks second to Argentina among the South American countries. In this line, the chemical industry again illustrates the possibilities of shifting the national position from importer to producer and exporter. The raw material, crude tartrates, is procured from the wine industry and is now made into tartaric acid. Formerly, tartaric acid was imported, and all the crude tartrates were exported to foreign countries. From 1919 to date the United States has imported from Chile nearly 11,000,000 lb. of the crude tartrates to manufacture tartaric acid.

With the advent of the war, Chile's need



Part of a nitrate plant at Pedro de Valdivia, Chile.

for chemicals and allied products for use directly and by consuming industries became urgent. Shortages of goods in industrialised countries formerly supplying these needs acted to accelerate the industrialisation of Chile and stimulated its industrial output. Lack of equipment, however, retarded the full development of Chile's industries, and expansion has been confined to those commodities for which manufacturing facilities already existed. Raw materials continued to be the outstanding products.

The facts as to the discovery, working, and exporting of Chilean nitrate during the last century are fairly well known. The large war demands for nitrogen are being met primarily with the synthetic product, leaving the natural for highly essential fertiliser purposes. Production of Chilean nitrate amounted to 1,450,000 tons in 1940-41. Iodine, although a by-product of the nitrate industry, nevertheless puts Chile in the position of the world's outstanding supplier of this vital chemical. Production has varied greatly over the years, from 185,000 lb. in 1930 to 3,275,000 lb. in 1941.

Other natural salts occurring in the Chilean desert are extensive deposits of sodium sulphate, sodium chloride, and borax. The sodium sulphate is exceptionally pure. Production of this salt likewise has varied greatly over the years. Government engineers have estimated as possible an average annual output of 100,000 tons. Production was as high as 75,900 tons in 1938. Recent figures are not available, but exports in 1941 amounted to only 10,300 tons, compared with 62,700 tons in 1937. Sodium

* Abridged from an article in *Foreign Commerce Weekly*, October 16, 1943, by C. C. Concannon and A. H. Swift, Chemical Unit, U.S. Bureau of Foreign and Domestic Commerce.

chloride output likewise has been up and down, with production in 1940 amounting to nearly 98,000,000 lb. Although crude borate of lime has been available for many years, the deposits had not been worked recently until in 1941 when operation was resumed.

Sulphur deposits of volcanic origin are numerous and extensive. In places, large masses of nearly pure sulphur are available and easily worked. There are a large number of sulphur-producing companies in Chile, but only a few are operating in what may be called a consistent manner. The government policy is one of assistance to Chile's sulphur producers. Between 1934 and 1938 production of sulphur averaged 22,000 tons annually plus an additional 10,000 to 12,000 tons of ore sold to local copper, nitrate, and explosives industries. Output increased to 36,000 tons in 1940.

In 1936, Chile supplied all its requirements of hydrochloric acid, sulphuric acid, sodium bisulphite, borax, copper and iron carbonates, aluminium, copper, iron, magnesium, and sodium sulphates, and iodine. A large part of the demand for caustic soda, ammonia, sodium hyposulphite, glycerine, bleaching powder, sodium silicate, tanning extracts potassium iodate, and potassium nitrate was domestically produced. Other chemicals made were nitric, acetic, boric, citric, and tartaric acids, acetone, turpentine, calcium hypochlorite, zinc oxide, and sulphuric ether. Chile was also manufacturing important amounts of high explosives, carbon dioxide, matches, fireworks, disinfectants, yeast, soap, and pharmaceutical and toilet preparations.

Fertilisers

Although all raw materials are available, the fertiliser industry in Chile appears to have so far remained far below potentialities. Nitrogen supplies are superabundant. However, it is reported that Chilean soils are more in need of other fertilisers. Potash is increasing in importance, both as a by-product of the nitrate mining and from recent exploitation of potash deposits.

Annual production of phosphatic fertilisers in 1939 was sufficient for only about one-fifth of the minimum set for satisfactory local agricultural production. Guano deposits serve as the chief source of phosphates, with small amounts of bone meal and imported superphosphates also consumed. Utilisation of apatite has been largely in the preparation of a product in which the rock is calcined with sodium nitrate and coal. There appears to be little production of superphosphate in Chile. The apatite deposits could furnish much greater supplies and, with the local production of sulphuric acid, constitute the basis of a superphosphate industry. In 1940, the Chilean Congress created the Consejo de Fertilizantes which will function as a National Fertiliser Board. The law gives the Board absolute power to regulate the production, sale, and use of both national and imported fertiliser products.

A wood-distillation plant on the island of Chiloe is capable of meeting most of the Chilean demand for methanol. Its annual production capacity was about 35,000 kg., but through deterioration of plant and lack of capital its present annual capacity is about 15,000 kg. Production of glycerine increased from 146,400 kg. in 1938 to 199,500 kg. in 1941. Since this glycerine is of a grade suitable only for cosmetic and some pharmaceutical preparations, the explosives industry must rely on the imported item.

Government Programme

In 1940 the Chilean Government had a general programme of national manufacturing development including the stimulation of certain chemical manufactures. Plans then were to increase production of chemicals and related items such as sulphur, tartaric acid, carbonate and bicarbonate of soda, caustic soda, calcium carbide, artificial fertilisers, explosives, rosin, turpentine, and printing ink. Real progress has been made towards the realisation of that plan. Tartaric acid no longer need be imported, and it is believed that production can even be expanded. A small sulphur-refining plant was constructed by a Chilean firm in Antofagasta in 1942. The Corporación de Fomento granted 300,000 pesos to the Cia. Azufrera Aguas Calientes to assist in the development of a sulphur deposit in the Tacora district. Calcium carbide production has been increased greatly, and, with the operation of the plant constructed in 1942, output was expected to be sufficient to permit exports.

The Corporación de Fomento also allocated funds to assist in the exploitation and development of the borax deposits of Guillagua y Punta Negra. Preliminary work indicated that the mines possess mineral calcium borate adequate for the production of 50,000 tons of borax. The bulk of the borates and boric acid made is expected to be exported. Output of ethyl alcohol, long produced in Chile, has been materially increased in recent years. Refined benzol is not produced, but one firm is reported to have a daily output of 200 litres of the crude product from the distillation of coal tar. Experiments are under way for the production of toluol.

Since the outbreak of war, and particularly since the entry of the United States into the conflict, industrialisation in Chile has proceeded apace, in both chemical-consuming and chemical-manufacturing lines. Although many chemicals are produced in varying quantities, as already indicated, the output in most instances is far from suffi-

cient to meet domestic needs, and the country must rely upon imports to satisfy remaining requirements.

A few of the organic chemicals for the supply of which the country is entirely dependent upon foreign sources are: formaldehyde, carbon tetrachloride, hexamethylene-tetramine, aniline oil and salts, ethylene glycol, amyl alcohol, and naphthalene.

Detailed statistics for 1942 are not available, but Chile's total imports of chemicals and allied products were valued at nearly £5,000,000, compared with £4,000,000 in 1941 and £3,600,000 in 1940. In this comprehensive grouping, however, are included appreciable amounts of mineral oils and greases, paraffin, mechanical and chemical pulp, and animal tallow and grease. In 1941, these particular items had a valuation of £1,750,000. Nevertheless, the upward trend in Chile's importation of chemicals and allied products has continued throughout the war, and in 1941 the total imports of chemicals and related products, in the more restricted sense, were valued at £2,250,000.

Source of Imports

Throughout the years and until the present war period, European countries—particularly Germany—have been the principal suppliers of chemicals and allied products on the Chilean market. The adjoining table, showing the imports by groups (with the percentages supplied by the three leading foreign competitors) has been taken from the official Chilean foreign trade statistics and is presented according to their grouping. Conversions were made at the rate of 1 gold peso = $0.2061. Peru and Argentina were other noteworthy shippers in 1941, furnishing 20 and 5 per cent., respectively, in that year.

The growth of those industries in Chile utilising chemicals in manufacture has been rapid during the last 10 years. This development has been and still is largely dependent upon imported chemicals, though many of these products could, it is believed, be produced in Chile. Acids are used in the thriving medicinal, textile, tanning, wine, food, and paint industries. Among the larger imports of heavy chemicals, ammonium nitrate is destined for the manufacture of explosives; calcium carbide is primarily for generation of acetylene; potassium xanthate is a flotation chemical; sodium bichromate finds its chief outlet in tanning; soda ash and caustic soda have extensive uses in various industries, particularly textiles, glass, soap, and leather; and sodium cyanide in fumigation and flotation.

There has recently been a gradual disappearance of the Chilean market for imported paints and varnishes because of the rapid development of the domestic industry. Such items as are now imported are chiefly for the limited quality market and are mainly marine paints, nitrocellulose products, special enamels, and lacquers. Considerable amounts of pigments are imported. Rosin and turpentine are consumed primarily in the paint industry. Printing ink continues to be imported despite local production—chiefly because of the general preference for the imported item.

CHILEAN IMPORTS, BY CHEMICAL GROUPS

Item and country		1938	1941
Industrial and synthetic organic chemicals	... $1000	2,108	2,863
United States	per cent.	22.5	72.1
Germany	"	41.5	8.2
Great Britain	"	27.3	14.5
Medicinals, pharmaceuticals, and toilet preparations	... $1000	865	1,093
United States	per cent.	16.9	52.1
Germany	"	58.6	7.0
Great Britain	"	5.8	6.2
Artificial fertilisers	... $1000	379	45
United States	per cent.	4.2	87.6
Germany	"	44.4	—
Great Britain	"	43.3	—
Explosives, matches, etc.	... $1000	644	353
United States	per cent.	43.8	96.0
Germany	"	44.6	—
Great Britain	"	7.7	3.2
Pastes, naval stores, resins, waxes, gums, oils, etc.	... $1000	4,585	6,308
United States	per cent.	40.1	46.6
Germany	"	2.3	5.2
Great Britain	"	5.3	—
Industrial alcohols	... $1000	5	22
United States	per cent.	93.8	99.9
Germany	"	—	—
Great Britain	"	—	.1
Paints, varnishes, dyes	... $1000	1,155	1,543
United States	per cent.	14.5	74.7
Germany	"	65.4	4.9
Great Britain	"	8.7	4.5
Soap	... $1000	28	22
United States	per cent.	13.6	30.2
Germany	"	17.4	.3
Great Britain	"	31.8	48.5
Other chemical products	... $1000	2,208	3,374
United States	per cent.	11.4	22.8
Germany	"	10.3	.8
Great Britain	"	6.2	13.4
Total	... $1000	11,977	15,623
United States	per cent.	26.7	58.5
Germany	"	24.5	2.7
Great Britain	"	9.7	8.7

Exports of Chemicals

The predominant position of nitrate in the Chilean chemical export trade has been maintained throughout the years, but since the war, and with the expansion of the domestic chemical industry, nitrate's share has been somewhat reduced. Of the total exports of chemicals and related products amounting to 138,554,800 pesos (£7,139,000) in 1941, nitrate and iodine accounted for 89 per cent. of the total, compared with 95 per cent. of total shipments valued at 160,259,500 gold pesos (£8,013,000) in 1938. Shipments of industrial chemicals and explosives accounted for 3 per cent. each and sulphur 2 per cent. in 1941. Most of the trade is with other Latin American Republics—outstanding exceptions being sodium sulphate, tartaric acid and tartrates to the United States, and potassium chlorate to Japan.

Using Sodium Cyanide Carburisers

Safety Measures to be Observed

From a Correspondent

TWO hazards of distinctly different nature are encountered in the handling of molten salts containing cyanides. They are the danger of burns caused by explosions, and the danger of poisoning. In the writer's experience, the former is much the more common in producing accidents. Nevertheless, the latter, when it does occur, is very serious and requires immediate and correct first aid. The fact that cyanides are extremely poisonous is well-known, but the first aid measures to be applied may be less familiar, in spite of the fact that safety instructions should be displayed wherever cyanides are used. Poisoning may result from the swallowing of cyanide, either in the solid form or in solution, or from inhaling hydrocyanic acid.

Recognition of Poisoning

Suspected poisoning by hydrocyanic acid gas may be recognised in a patient from his complaining of throat-irritation, from a watering of the eyes, and from the increased difficulty in his breathing. After the doctor has been sent for, the patient should be removed to a pure atmosphere and kept quiet, preferably in a recumbent position. If he loses consciousness and his breathing appears to be failing, artificial respiration should be applied. The patient should be kept warm and, if necessary, oxygen or a resuscitative mixture of oxygen and carbon dioxide should be administered.

Suspected poisoning by cyanide solutions or the solid salt is treated in a similar way to poisoning by the gas. The only point is that the poisoning may be much more acute after swallowing the salt. A useful antidote which the patient may administer to himself, to be taken immediately after poisoning is suspected, is made up as follows:

Solution A consists of 5 per cent. of sodium carbonate in water, and *Solution B* of 13 per cent. ferrous sulphate (heptahydrate) in water; a suitable dose consists of 50 ml. of each solution mixed in a beaker. In the heat-treatment department with which the writer is concerned, stock solutions of this antidote are kept in a prominent position for an emergency.

To prevent cases of poisoning, cyanides must be stored in a warm, dry place, well away from acids and the water supply. Operators who handle them must be trained to wash their hands thoroughly, and NOT to eat or smoke anywhere near them.

Burns from Molten Salt

Burns may be contracted in two ways, either from immersing wet work in the molten salt or from explosions that may occur when melting up from the solid state. Explosions produced by immersing wet work are, of course, caused by the rapid generation of steam under the surface of the liquid salt, which results in the latter being scattered, and the operator being burnt. Burns incurred in this way are due entirely to the operator's neglect. If work is thoroughly dried before immersion, preferably in the pre-heater if one is incorporated in the furnace, there is no danger

Explosions

Explosions which occur in heating the salt are rare but can be serious. They are caused by gases liberated in the body of the salt. These gases, mainly carbon monoxide and nitrogen, exert a tremendous pressure, and the pressure is released when the crust on the liquefied salt is pierced, and the molten liquid is ejected upwards in the form of a shower, usually burning the operator. The writer has seen an accident caused by heating a full pot of salt and he can assure readers that the danger of being burnt is great. On this occasion, about three-quarters of the salt was ejected from the pot. Fortunately, the operator was only slightly burnt but, had he been standing a foot from where he actually was, the whole shower of salt would have fallen on his head and shoulders. It is only when the pot is more than about two-thirds full and the heating is too rapid that there is any danger. The main precaution is to ensure that the salt melts at the top as well as the bottom of the pot, and the burners on the furnace should be adjusted to that end.

First aid rendered to the recipient of a burn is very much the same as that applied to a man who has been burnt by metal. The clothing around the burn should be torn away, and the wound should be soothed with the usual anti-burn lotions. The doctor must be summoned immediately, because the salt will have burned its way into the flesh and will have to be removed surgically.

The use of ultrasonic waves for the preparation of permanent emulsions of such immiscible substances as oil and water was described by Professor Karl Sollner, of the University of Minnesota at the recent Pittsburgh meeting of the American Chemical Society. The technique has been applied to the homogenisation of milk, and Professor Sollner suggested it could be used to disperse very fine metallic particles through a suspending medium, and also to produce special photographic emulsions with ultra-fine grains.

Fire Safety

A Few Words to Executives

by JOHN CREEVEY

WHEN Sir Stafford Cripps, Minister of Aircraft Production, referred recently to the need for a still greater downward trend in outbreaks of fire at factories, he laid emphasis on the point that a considerable number of fires are the result of carelessness on the part of persons employed in the factories. This is certainly true, for the attainment of safety in all aspects related to industry is in large measure due to the individual, provided that a general scheme of precautions has been formulated and laid down in works regulations. Nevertheless, the worker is not wholly to be blamed for outbreaks of fire and the rapidity with which a fire spreads once it has started. The same remarks apply to all other safety considerations; a perusal of the prosecutions noticed in the Industrial Accident Prevention Bulletins issued jointly by the Ministry of Labour and National Service and the Royal Society for Prevention of Accidents convinces one of that, and these bulletins commonly show that certain unsafe conditions or practices have been permitted (or at least have been allowed to pass unnoticed) by owners or executive staffs of factories, upon whom there has been due censure (when an accident has been reported) and sometimes a fine to emphasise the seriousness of the case. Here then, are a few words addressed to executives; not that the executive has been singled out with prejudice, for a later article will be addressed to the worker himself.

Personal Contact

If the menace of fire is to be wholly eliminated there must be co-operation throughout the works, and all executives will do well to ask of themselves just what has been done towards attaining freedom from outbreaks. Although a works fire brigade may have been formed and certain employees trained in fire-fighting, that is not strictly a matter of fire prevention; it is means for quelling an outbreak and preventing a fire from causing unlimited damage. Prevention of fire is a phase in works organisation, and truly commences at the desk of the executive, who may or may not have appointed a works safety officer. First let it be asked how often have employees been called together—a few at a time, to avoid hindering works routine—so that the great menace of fire can be pointed out to them, and how the individual contributes in its avoidance. The avoidance of fire, like other safety precautions, has to be brought to the fore in the mind of the worker; if all workers were observant of simple safety matters there would be no tools left lying in a gangway, no slipping of ladders, no falling of packages from trucks in motion. Therefore take trouble to bring the menace of fire before the worker more directly than by a mere display of posters. The posters which are available are admirable, and useful to a degree which can never be fully measured, but a talk by a busy executive in a few minutes of the works time will often leave a better impression upon the mind of the employee. In far too many concerns there is a notable absence of personal contact extended to all classes of employees.

Two Pairs of Eyes

Again, how often do you make an inspection of the works to ascertain whether or not there are safety precautions which are not being fulfilled? Or whether some undesirable practice that increases the fire risk is getting established. This duty may certainly be left to the works safety officer, but two pairs of eyes are always more observant than one pair; the extra pair, coming fresh upon the scene with a purpose, is sometimes quicker to pick out the unusual or the undesirable. Look into the odd corners of the works upon your tour of inspection, go behind stacks of material in storage, do not hesitate to imagine conditions suitable for outbreak of fire when a heap of empty bags is awaiting collection and you know that there is no spark arrester upon a near-by chimney; let your tour be inoffensively inquisitive, and not one of ceremonious dignity or imbued with the desire to get it over as quick as possible.

Smoking may be prohibited, and the non-observance of this works regulation made a crime; but if the fire danger from smoking is emphasised as regards its effect towards fellow workers, in physical injury and materially from point of view of loss of employment due to damage at the works, and of how each worker is individually responsible for the personal safety and employment of others, the facts are sometimes better impressed than in other ways.

Apart from smoking, there is the matter of undesirable accumulations of combustible waste. The eye must always be alert for this, for even when means have been installed to deal with waste, the contingency of a fluctuating throughput in a particular section of the works may build up accumulations beyond the capacity of measures for safe disposal. Waste must be cleared away and safely disposed as quickly as becomes convenient, either continuously or intermittently according to quantity, but certainly

cleared away completely at the end of each working shift. Moreover, the mere removal at the point where the waste is produced is not sufficient to avoid fire; the ultimate place for deposit or treatment must be such as offers no general fire risk; likewise, in passing from point to point a little careful thinking is sometimes needed to avoid introducing a new risk. For instance, in one works the combustible material being passed continuously to an incinerator, where the heat was utilised for raising the temperature of boiler feed-water, caught fire in the conveying system because the man attending the incinerator allowed the material to accumulate at the point of discharge, thereby increasing the amount of flame and sparks.

If combustible waste is removed by a conveyor or an elevator, the maintenance staff must give particular attention to the bearings on the equipment, in order that overheating may never occur; if there is removal by suction through a system of ducts, care must be taken to see that the system is continuously in proper operation and that any inoperable point comes immediately to the notice of some person, whose immediate duty it is to see that matters are put right and any accumulation of waste is removed without delay—if necessary by means which offer suitable temporary employment.

Storage Problems

A certain number of fires occur through bad storage conditions, a factor which invariably increases the seriousness of an outbreak of fire by facilitating its spreading. Certain materials are dangerous in close proximity to each other: other materials, when in actual contact, may cause a spontaneous outbreak of fire; it need not be two chemical products, for oily waste has this risk to an extent which is not as fully realised as it might be—therefore provide a receptacle for oily waste, and see that it does not accumulate. Likewise guard against the storage or the accumulation of combustible waste in unfavourable situations. There may be excessive heat from a steam pipe, hot air from a fan, heat radiated from a partition; a wall, even though of fireproof construction, may get sufficiently hot (by reason of a furnace on the other side, for instance) to start a fire where the wall is in contact with combustible material.

As the method of stacking materials can aid or retard an outbreak of fire, this point should receive consideration and advice sought, if necessary, from others with longer experience or from some research station. Upon all these points it is the duty of the works executive to be observant.

By all means draw up regulations and bring them to the notice of employees, but supplement the instructions posted on notice boards with an occasional short talk, arranged to suit the works routine and general sectional organisation. These talks can be supplemented by the showing of films dealwith fire prevention or fire fighting; such films can be hired with the projector. In wording notices, lay emphasis on the sentences commencing "Do not"; try to make the worker conscious of the debt which he owes to those who are working with him, both as regards personal safety and the safeguarding of their employment, as well as his own. No one in congenial employment wants to lose it, even though work may readily be forthcoming elsewhere under wartime conditions. In all safety matters it is well to make the individual feel that he is a responsible member of the works, and that the safety of the works in the past has been due as much to the individual as to the precautions which have been adopted.

LETTER TO THE EDITOR

British Non-Ferrous and Non-Metallic Minerals

SIR,—Referring to Mr. Morrison's recent statement that special attention is being paid to preparation for resumption of world trade, and the fact that the export trade will obviously be given high priority in post-war industrial planning, I wish to draw the Government's serious attention to the following:

In the past, British non-ferrous and non-metallic minerals have, in particular, suffered owing to the marked superiority of the foreign articles produced for export and, in consequence, such foreign competition can now only be overcome by the application of a much higher standard technique than commonly understood and practised in this country to-day. Moreover, and as already confirmed by Dr. Wm. Cullen recently, the mineral resources in this country are far from being unlimited, hence the urgent need not only to conserve these resources but also to apply greater skill in their preparation for home and overseas markets.

In regard to the technical side, the first essential is to reorganise present methods and practices completely, and to substitute for them the scientific classification of the various deposits of each separate mineral, with due consideration for their subsequent treatment and marketing standpoints. To act otherwise merely constitutes a continuance of the present waste of valuable national mineral assets through the production of inferior results; whereas, given the improved technique, foreign competition can easily be overcome and vastly superior articles produced at an economic cost per ton.—Yours faithfully,

WALTER H. REYNOLDS.

November 12, 1943.

The Fatty Acids

Products of Increasing Importance

From a Correspondent

FATTY acids are among the most important of the materials necessary to the present and the future industrial programme. This is because fatty acids are essential for the production of both natural and synthetic rubber; because they are needed for the making of synthetic resins—particularly alkyd resins; because a high return of glycerine is a by-product of fatty acids manufacture; and because insecticides, soap, amides and a host of other critical chemicals depend upon high purity fatty acids for their making.

The acids derived from a few oils illustrate their importance.

From castor oil comes sebacic acid for making nylon for parachutes; and undecylenic acid for making insecticides to protect soldiers from germ-carrying insects. Transparent plastics similar to those used in the nose and turrets of bombing planes are made from other acid fractions of castor oil. From coconut oil comes a dozen different fatty acids, including lauric acid, which is so important for plasticising and for improving the lathering quality of soaps, especially the salt water soaps used by seamen. From linseed oil come linoleic and linolenic acid, which are isomerised into conjugated double-bond molecular structures, and converted into a synthetic quick-drying oil that takes the place of china-wood (tung) oil, now almost unobtainable, as a base for protective coatings for all types of essential equipment. From soya, cottonseed, groundnut and palm oils come fatty acids for synthetic resins.

The peace-time uses for fatty acids promise to excel all anticipations, for although the production of these acids has been proceeding for some years at a high standard of purity and excellence, the industry can be said to be still in its infancy.

Natural Sources

Fatty acids are procured principally from oils and fats obtained from fish, animals and vegetables. These substances are compounds of glycerine and fatty acids, the fatty acids being mostly long-chain monobasic acids. In the production of fatty acids from them it is necessary first to split off the glycerine, the yield of which varies according to the type of oil. After removing the glycerine, the residue consists of crude fatty acids, which may then be refined by disillation, cold pressing or other means; in the best modern fatty-acid plants the process employs new types of equipment that distil the crude fatty acids to a degree of quality hitherto unobtainable, the finished products being completely free of albuminous and oxidised matter, and much lighter in colour than in years gone by.

As to sources, the animal oils are obtained by rendering crude animal fatty parts, and the vegetable oils from such plants and trees as the palm, coconut, tung, castor, flax, rapeseed, perilla, soya-bean, corn, cotton, olive and sunflower. The fish oils are those obtained from cod, menhaden, herring, sharks and sardines; and then there are whale and sperm oils too.

Each of the above has its own characteristic content of mixed fatty acids, and consequently each yields fatty acids that vary in their industrial applications.

Glycerine Separation

The glycerine is usually split off by one of three methods. In the Twitchell process the fats are boiled with steam in the presence of a catalyst and water for 24 to 48 hours, with the result that water reacts with the fat to liberate fatty acids and glyceral, the latter dissolving in the water to form the glycerine-water which separates by gravity from the fatty acids. In another process the oils are heated with steam in an autoclave at a pressure of 150 to 350 lb./sq. in., which effects a similar hydrolysis. Alternatively, the oils or fats can be saponified with alkali to liberate the glycerine; by splitting the saponified fat with mineral acid the fatty acid is obtained. In all systems the glycerol water is drawn off, chemically treated, and sent to an evaporating unit which boils off the water under vacuum, leaving a high concentration of glycerine.

The fatty acids remaining from these processes may be sold in their crude state or refined by distillation or other methods. When distilled they condense into products of good colour and high purity. The pitch residue from the distillation is marketed for a number of specialised purposes, such as the manufacture of paints, insulation for electric wiring, and roofing and sound-deadening felts.

The striking improvements in production methods and the subsequent increase in industrial uses for the purer fatty acids that resulted from these improvements account for the great advances registered in the fatty acid field. This development towards a larger consumption and the establishment of a fully-fledged industry was influenced by five factors: (1) the rapidly rising consumption of lighter-coloured fatty

acids in the synthetic resin field; (2) the improved methods of manufacturing soaps and cosmetics; (3) the importance of recovering high-grade fatty acids from the by-products of the edible oil and fat industry; (4) the esterification of fatty acids in the development of quick-drying synthetic oils for the protective coating industry; (5) the discovery of the benefits of using certain fatty acids or fatty acid blends in rubber formulations.

Rigid Manufacturing Control

The requirements made on the fatty acid industry to-day are such that practically all fatty acids bought are ordered according to rigid specifications. Control of manufacturing processes, of necessity therefore, must be correspondingly rigid. As a result the products are uniform and can be relied upon to meet the specifications under which they were purchased.

Four factors in the use of fatty acids in alkyd resins, for example, ought to be noted: (1) fatty acids give better selectivity for making standard blends; (2) distilled fatty acids have greater purity; (3) distilled fatty acids have superior colour (especially if treated for heat-resistance); (4) distilled fatty acids show absence of hydroxy groups. It might be mentioned that it is quite easy to form light-coloured monoglycerides from these fatty acids to be used in the production of very light-coloured resins.

Soap Chemistry

In the broad field of soap chemistry, there are many factors which appeal to soap makers, favouring the use of fatty acids rather than whole oils. Fatty acids make soap more quickly with better colour and soap makers can multiply their present capacity several times through the use of fatty acids. The time required when working with the whole oils has generally been 36 to 48 hours; with fatty acids the saponification cycle takes three to four hours. Thus the capacity of smaller plants can be greatly increased without any additional labour, steam or overhead expenses.

With the great strides that have been made in fat chemistry over the past decade, there are to-day on the market more fatty acids derived from natural oils, and combinations of those fatty acids, than there are natural oils. From such fatty acids and their combinations there can be derived esters which are beyond the range of the fats and oils found in nature. Not only are there the complete fatty acids of the whole oils, such as the fatty acids of soya-bean oil, corn oil, coconut oil and similar vegetable oils, but these complete oil fatty acids have in turn been fractionated to give a predominance of such individual fatty acids as lauric, myristic, capric, palmitic and others, and these in turn have allowed a myriad of combinations.

The most outstanding recent development connected with fatty acids lies in the field of synthetic drying oils. Of these, two are outstanding: dehydrated castor oil made by the Scheiber process as opposed to the Woburn method directly from oil, and the isomerised oils with conjugated double-bond structure. Dehydrated castor oil is supplied as a high-quality, light-coloured oil, and is especially distinguished for its low acid number and absence of odour. It shows some of the characteristics of tung oil, without being too active. It exhibits little autoxidation, and has less polymerisation activity when compared with tung oil. Therefore no premature loss of adhesive power and elasticity, or early destruction of the coatings, takes place.

Conjugated Fatty Acids

The most outstanding recent work, however, has been done on conjugated oils in which new processes have effected a shifting of the molecular structure of certain oils to form conjugated double-bond structures where isolated double-bond structures existed before. These acids include conjugated soya-bean fatty acids and conjugated linseed fatty acids. The process of isomerisation to give a conjugated double-bond structure can be applied to a number of other oils. They represent a new class of raw material. The molecular re-arrangement results in a remarkable change in properties, foremost of which is the speed of polymerisation of the esters of these conjugated acids.

Conjugated soya-bean and linseed fatty acids offer unusual advantages for the preparation of alkyd resins. Owing to their ability to polymerise rapidly at moderate heat, medium and long oil-length alkyd resins of high viscosity may be prepared from them in a very much shorter time than is possible with the corresponding natural (distilled or "split") fatty acids. The cooking time for alkyd resins prepared from the ordinary fatty acids may be reduced by half or even more, by partial replacement with conjugated acids. Alkyd resins made from conjugated fatty acids have greater thermo-setting speed than alkyd resins made from the corresponding natural fatty acids, and they require shorter baking times.

Measures to assist in the advancement of chemical industry in Australia were recently the subject of discussion by the Society of Chemical Industry of Victoria. Proposals included the establishment of a Society of Chemical Industry Section in the library of Melbourne Technical College; prizes to students completing the most satisfactory year's course in the same college; and a refresher course covering some aspect of applied chemistry and available to members of the Society.

A CHEMIST'S BOOKSHELF

INORGANIC CHEMISTRY, by P. C. L. Thorne and E. R. Roberts. Fourth edition. London: Gurney & Jackson. Pp. 921. 28s.

This is the fourth edition in English of Dr. Fritz Ephraim's *Text-Book of Inorganic Chemistry*, which maintains its deservedly important place on the chemist's bookshelf, both for accuracy and for completeness. The present edition, slightly enlarged though not, we are glad to see, increased in price, has achieved up-to-dateness by substitution rather than by addition. Due cognisance has been taken of the advances in physical chemistry since the last edition, and a notable alteration is the revision of the Genealogical Table of Radio-Active Elements, which has been brought into line with modern theory, a place being given, for instance, to the actinium product (AcK) with atomic number 87, which has the properties of an alkali metal, as would be expected from its position as a homologue of cæsium. The "Decomposition Series" has been more correctly named "Disintegration Series" and a section has been added on Nuclear Disintegration. The section on the structure of the nucleus and the theory of nuclear forces has been rewritten in consonance with present-day ideas, due warning being given that no theory can be considered complete as yet. In a later chapter the quantum-mechanical treatment of problems in the theory of metals, as outlined by A. H. Wilson, and by Mott and Jones, is adequately dealt with.

Those who are familiar with the work will note that Dr. E. R. Roberts has succeeded Dr. A. M. Ward in collaboration with Dr. Thorne. Mr. A. Hedbon, of the chemistry department, Chelsea Polytechnic, assisted with the index and proofs of the new edition, which is a credit to all concerned.

THORPE'S DICTIONARY OF APPLIED CHEMISTRY, 4th Ed., Vol. VI (Glauberite-Invertase), edited by (the late) Sir Jocelyn Thorpe, and Dr. M. A. Whiteley. London: Longmans. Pp. 611. 80s.

Although some variation in the "feel" of this volume of "Thorpe" is to be recorded, as compared with the five volumes already published, owing to war-time exigencies concerning binding-boards, etc., there is no falling-off as regards the contents. Dr. Whiteley and her coadjutors well maintain the traditional standard.

It will be noted that the present volume covers the area of the prefixes glyco- and hydro-, and the expected articles under these heads are of the highest quality. Hydrogenation in its various aspects occupies 34 pages, and is dealt with by several notable authorities: Dr. H. N. Rydon deals with Hydrogenation, pure and simple; Dr. J. N. Goldsmith with Hydrogenation Analysis; Dr. R. Holroyd with the Hydrogenation of Coal; and Dr. J. H. Twigg with Hydrogenation Mechanism. Professor J. J. Sudborough deals with Hydrolysis and the article on Hydrogen itself is by Mr. H. S. Coles and Dr. P. H. Sykes, both leading authorities on the staff of I.C.I. The exhaustive article on glycerin is in the safe hands of Dr. Elsa Lewkowitsch and Dr. H. E. Cox, while the Glycosides are dealt with by Dr. G. T. Young.

Other important subjects covered in the present volume are Indigo and the Indigoids—both by Dr. E. H. Rodd, of I.C.I. (Dyestuffs), and Inhibitors (Gum), by Dr. R. F. Goldstein (of the same company). The scope of the latter article reveals the ever-growing importance of chemistry as applied to the internal-combustion engine. Dr. R. M. Barrer, of Bradford Technical College, provides a clear and informative section on Heterogeneous Reactions; of equal scope and value is Mr. R. P. Bell's article on Homogeneous Catalysts. A catalogue such as this must not be allowed to exceed reasonable limits; but special mention should be made of Sir Thomas Rose's article on Gold, and Dr. Glyn Davies's shorter monographs on the rarer metallic elements within the volume's limits. Incidentally, beryllium crops up here under its alias glucinum, as well as (in certain aspects) in Vol. II.

We were sorry to see that the few small errors we noted in our review of Vol. V have not been included in the list of errata; a cursory glance at the present volume reveals the presence of "isnapic" for sinapic acid on p. 95, and the misprint "brached-chain" on p. 82. In view of the necessarily somewhat haphazard way in which the articles are titled, the inclusion of an Index to Vols. I-VI (prepared by Dr. Goldsmith) is most welcome; and it is good news to read that each subsequent volume will contain an index.

ANNUAL REPORTS ON THE PROGRESS OF APPLIED CHEMISTRY, 1942. Vol. XXVII. London: Society of Chemical Industry. Pp. 545. 20s., to members 11s. 6d.

Every chemist who requires to keep abreast of the latest and most important developments in chemical technology will find this volume as indispensable as its predecessors. To the task of coping with the flood of scientific literature, abstracts and reviews bring welcome assistance, and the "Annual Reports" are invaluable reference books. The latest volume represents the labours of some fifty contributors. Mr. F. G. Crosse, F.I.C., is again responsible for the excellent index.

Personal Notes

MR. GEORGE REGINALD GIBBS, M.A., B.Sc., A.I.C. has been awarded the M.B.E. (Military Division).

SIR GEORGE THOMSON, Professor of Physics at the Imperial College of Science, has been appointed scientific adviser to the Air Ministry.

DR. CLIFFORD WHITWORTH, F.I.C., of Loughborough College, has been appointed hon. secretary of the East Midlands Section of the Royal Institute of Chemistry.

PROFESSOR A. V. HILL, M.D., D.Sc., M.P., secretary of the Royal Society, has been invited by the Government of India to visit India and advise on problems of scientific and industrial research.

MR. R. N. DUKE, C.B., D.S.O., M.C., has been appointed chief officer of the Petroleum Division of the Ministry of Fuel, in succession to Sir William Brown, who is transferred to the Ministry of Home Security.

The new vice-chairman of the British Barytes Producers' Association is not Mr. D. J. W. Orr, as stated in our last issue, but MR. IAN D. ORR (Arran Barytes Co., Ltd., James Miller, Son & Co., Ltd., and William Wharton). MR. ALEXANDER REID, M.Inst.C.E., F.G.S., continues as treasurer and hon. technical consultant.

MR. PERCY HARRIS, of Foxhole, St. Austell, manager of the Carpalla China Clay Works (owned by Spicers, Ltd.), has been adopted as parliamentary candidate by the Liberals of the Penryn and Falmouth Division of Cornwall. Mr. Harris has been associated with the china-clay industry for over 30 years, and is secretary to the Board of Trade's China Clay Advisory Committee.

PROFESSOR H. RAISTRICK has relinquished the chairmanship of the Microbiological Panel of the Society of Chemical Industry, in which post he is succeeded by DR. B. T. P. BARKER, Professor of Agricultural Biology at Bristol University. At last week's meeting Dr. Thornton said that the panel owed its existence to Professor Raistrick's initiative, and its progress to his drive.

Obituary

MR. WILLIAM C. WALL, of Wall Chemicals (Canada) Corporation, Ltd., a prominent Montreal industrialist, died suddenly on October 15, aged 53, at Westmount, Quebec, Canada.

A well-known German chemist, PROFESSOR I. TRAUBE, formerly of the Charlottenburg Hochschule, Berlin, has died in exile in Edinburgh. Expelled from his native land as a Jew in 1938, he had continued his researches in this country.

The death is announced at the age of 70 of MR. FRANK SOUTHERDEN, B.Sc., F.I.C., at his home in Exeter on November 13. Mr. Southerden, who trained at the Finsbury Technical College, was for many years managing director of Evans, Gadd & Co., Ltd., wholesale druggists, of Exeter. He became an A.I.C. in 1894, and an F.I.C. four years later. For the periods 1925-28 and 1933-36 he served on the Council of the Institute.

The death is reported of DR. JOHN WESLEY SHIPLEY, the Canadian chemist, on July 1 at the age of 65. He was formerly head of the Department of Chemistry of the University of Alberta. His scientific interests covered such widely different subjects as metallic corrosion, alternating current electrolysis and paper chemistry. His close association with the paper industry in Manitoba led him to write a book about pulp and paper-making in Canada. One of his four children, Pilot-Officer George Shipley, is now serving as night-fighter pilot in this country.

DR. ALEXANDER LAUDER, F.I.C., F.R.S.E., head of the chemistry department of the Edinburgh and East of Scotland College of Agriculture from 1904 until 1936, died at Greenock on November 11. Dr. Lauder, who was a native of Greenock, became an assistant to Professor J. J. Dobbie, F.R.S., at the newly-founded University of North Wales at Bangor, and with him made an elaborate investigation into the alkaloids of corydalis. He was, with Dobbie, a pioneer in the study of absorption spectra. In 1904, Dr. Lauder was appointed head of the chemistry department of the newly-established Agricultural College of Edinburgh; he had served also on the councils of the Royal Institute of Chemistry and the Society of Chemical Industry.

New Control Orders

Copper Wire Prices

The Control of Non-Ferrous Metals (No. 13) (Copper, Lead and Zinc) Order, 1943 (S. R. & O. 1943, No. 1592), which came into force on November 13, increases the maximum price of black hot-rolled copper wire rods from £65 10s. per ton to £65 15s. per ton, delivered buyer's premises, on account of increased delivery costs.

The discovery of helium on the Navajo Indian reservation in New Mexico, which is situated near the borders of Arizona, is announced by the U.S. Bureau of Mines. The deposits, the report adds, equal or possibly exceed in extent those of Texas, hitherto the principal source of supply.

General News

The Bureau of Chemical Abstracts is issuing a new abstract section—Abstracts C—which will be concerned with analysis in all its aspects and with apparatus.

A complete set of British Standards is available for reference in the Public Library, Commercial and Technical Section, Municipal Buildings, Leeds.

Experiments carried out at Kew Gardens have led to the conclusion that the cultivation of *kok-saghyz*, the Russian rubber-producing dandelion, would not be economic in this country.

The Joint Council of Professional Scientists has been invited to submit evidence to the Hankey Committee which is dealing with post-war problems concerning professional appointments and the rehabilitation of technical personnel.

During this year one-quarter of all contributions to the Red Cross Penny-a-Week Fund has been devoted to aid to Russia. By the end of October over £1,000,000 had been transferred from the Penny-a-Week Fund for that purpose. It may be remembered that in 1941 Penny-a-Week Fund contributors raised £420,000 in three months in order to send the medical and surgical supplies that were so badly needed by Russia at that time.

Recently published bulletins on Fuel Efficiency, issued by the Ministry of Fuel, include No. 23: Heavy-Oil Engines; No. 24: The Industrial Use of Liquid Fuel; and No. 25: Steam for Process and Heating. These should have already been circulated in appropriate quarters; liquid-fuel users and steam users who have not received their copies should apply to the nearest regional office of the Ministry.

Although wholesale prices in October, according to the Board of Trade index, dropped by 0.3 per cent. compared with September, the industrial index figure rose from 164.7 to 164.8 (1930 = 100). In this figure the largest rise—only 0.2 per cent.—is contributed by the chemicals and oils group, which increased from 150.4 to 150.6, this rise being entirely attributable to an increase of nearly 3 per cent. in the average price of fertilisers.

The British Aluminium Co., Ltd., changes, on November 29, the address of its head office to Salisbury House, London Wall, London, E.C.2. The telegraphic address will be "Cryolite, Ave., London," and the 'phone number CLErkenwell 3494. From the same date the offices at Shrewsbury and Marlborough Court, Pall Mall, will be closed. The addresses of the Birmingham and Leeds offices, and of the London depot, remain unchanged.

From Week to Week

Prices of imported animal fats for the period ending January 8, are announced by the Ministry of Food as follows: per ton. c.i.f., Empire stearine, £60 (in softwood barrels or tierces, £1 extra); Empire edible tallow, £51 10s. (in hardwood barrels or tierces, £3 5s. extra); South American fats, in barrels or tierces duty paid, premier jus, £62 15s.; oleo oil, £70; edible tallow, £54 15s.

It is announced by the Royal Institute of Chemistry that papers for the 1943 Newton Chambers Prize should be posted to reach the Hon. Secretary, South Yorkshire Section, 52 Whirlow Grove, Sheffield 11, not later than December 31. The prize may be competed for by any Fellow, Associate or Registered Student of the Institute who was under 31 years of age on January 1, 1943; papers must embody the candidate's own observations on some aspect of the application of chemistry to the promotion of industrial welfare.

Revised ex-store prices have been announced for certain lease-lend pharmaceuticals distributed on behalf of the Ministry of Supply by the Drugs and Pharmaceuticals Importers' Section of the British Chemical and Dyestuff Traders' Association. The commodities affected are: amidopyrine, phenazone, pepsin, peptone, potassium guaiacol sulphonate, and urethane (in original containers, and 7-lb., 14-lb., and 28-lb. parcels); hydrastine hydrochloride (in 25-oz. and smaller parcels); and quinoline (in 50-lb., 100-lb., and 500-lb. drums, as well as smaller containers).

Foreign News

Manufacture of litharge in South Africa has started in one of the factories of Bartle and Company, Johannesburg.

Colombia's platinum production last year showed a marked increase, being 55,543 fine oz., compared with the previous year's figure of 37,349.

The Parliamentary Secretary to the Ministry of Economic Warfare, Mr. Dingle Foot, told the House last week that 1164 Swiss firms are now "blacklisted."

The Imperial Institute discloses in its latest bulletin that the biggest diamond ever found in the Colonial Empire was recently discovered in Sierra Leone. The stone, which weighs about 530 carats in the rough, is probably the eighth largest ever found.

U.S. production of vinyl resin will reach a figure of 10,000,000 lb. a year early in 1944, states the War Production Board, which, however, holds out no hopes that the allocations of this material for civilian purposes will be increased.

The United States Senate last week passed a bill authorising the expenditure of £7,500,000 for the construction of pilot plants to produce petrol from coal.

Production of mint oil in Brazil is increasing. The State of S. Paulo, for instance, is aiming at an annual output of 340 tons a year. The oil contains 75-80 per cent. menthol.

The Bayer chemical works of the I.G. at Leverkusen, near Cologne, are stated to have been largely destroyed by R.A.F. Mosquitoes, on November 5, according to a German report from Stockholm, transmitted by Reuter.

A fireproof ceramic glaze is being used instead of paint to coat the metal surfaces of U.S. warships. Called Seaporcel, it is a silica product, which is first sprayed and then fired on the surface of the metal.

Ceylon's coconut-oil production for the first six months of this year is estimated at 41,700 long tons. Output for the latter half of the year is expected to be greater by 1300 tons; of the total 40 per cent. will be consumed locally, leaving an exportable surplus of about 25,000 tons.

A new cellulose factory has been completed in Slovakia, where the wood supply is especially favourable, by the Chemische Industrie A.-G., Pressburg, in combination with the A.-G. Dynamit Nobel. It will produce P K R (Vistra) fibre in cotton and wool qualities.

Iron ore reserves of Free China are estimated at 140,000,000 tons, of which 17 per cent. occurs in Szechwan, 20 per cent. in Sikiang and 22 per cent. in Kweichow. Last year's output of iron in Szechwan was 44,341 tons, compared with 41,199 tons the preceding year.

The 5 per cent. increase in silver production (recoverable metal) in U.S. mines recorded in May last, was mainly due to the larger quantity of zinc-lead and copper ore treated by the Anaconda Mining Co. in Montana. Other slight rises were noted in Idaho and Nevada.

A copper deposit containing 2 per cent. of that metal has been found in the mining district of Mapoakou, Antung Province, Manchuria. The Japanese radio also reports that newly-discovered copper fields in the Southern Celebes in the Dutch East Indies are to be mined on a large scale, by both open-cast and ordinary methods.

A new institute, with laboratories of its own which will be devoted to fundamental glass research, is now being planned in the U.S.A. The sponsors of the institute are the American Optical Co., Bausch and Lomb Optical Co., Corning Glass Works, Eastman Kodak Co., and Pittsburgh Plate Glass Co. It is expected that all concerns interested in glass research will be eligible for membership of this research association.

Quartz-crystal production of the U.S.A. and Brazil is now capable of providing supplies for all the Allied nations. This statement was made by the U.S. War Production Board, which reported that as a result of the co-ordinated efforts of American scientists, shortages of various critical materials had been overcome

Shortage of arsenic for use in cattle dips has led to experiments in South Africa to test the efficacy of coal-tar derivatives for this purpose. Dr. J. Meyer, an industrial chemist of Johannesburg, is reported to have found that pyridines, purified by distillation at temperatures up to 220° C., are lethal to ticks when applied as a fine spray.

The Spanish company SNIACE (Sociedad Nacional Industrias Aplicaciones Celulosa Espanola) is establishing a cellulose factory at Torrelavega, in the province of Santander, which will use eucalyptus wood as its raw material. The annual production is planned to be 10,000 tons of pulp, 3500 tons of cellulose wool and 3500 tons of artificial silk.

Demerol, the substitute for morphine first synthesised in 1939 by two German scientists, is now being produced in large amounts by the Winthrop Chemical Co., of America, and will shortly be available to general practitioners. A derivative of coal tar, its supply till now has been limited and its use restricted almost entirely to university hospitals.

The preparation of pure crystalline boron is described in the *Journal of the American Chemical Society* (1943, *65*, 10, p. 1924). The boron was found to crystallise in the form of needles or hexagonal plates, but optical evidence indicates that both forms may belong to the monoclinic system. In contrast to the great reactivity of the element when finely divided, crystalline boron shows great resistance to chemical attack.

The lactic-acid method of producing methyl acrylate, investigated at the Eastern Regional Research Laboratory of the U.S. Bureau of Agricultural and Industrial Chemistry, and described at the recent American Chemical Society meeting (THE CHEMICAL AGE, 1943, *49*, p. 364 and p. 415), is now being tested on a pilot-plant scale by a number of commercial manufacturers. This news is given in the latest issue of *Chemical Industries*.

The Leeds & Northrup Company have produced a new and improved portable universal *p*H indicator, which is accurate and direct-reading not only with its own self-contained glass electrode but also with the quinhydrone, hydrogen or any other electrode following the Nernst equation. The instrument is described in a 16-page catalogue (No. E-96/3), obtainable from the company, at 4934 Stenton Avenue, Philadelphia 44, Pennsylvania, U.S.A.

Forthcoming Events

The Cardiff and District section of the **Royal Institute of Chemistry** is meeting at University College, Cathays Park, Cardiff, on **November 20,** at 3 p.m., to hear a lecture by Mr. R. G. Minor, F.I.C., on "Food Adulteration."

The annual general meeting of the **British Rheologists' Club** will be held at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, on **November 20,** at 2 p.m. After the business meeting Commander C. F. Goodeve, F.R.S., will deliver a presidential address entitled "Rheology and Naval Problems."

Professor J. C. Drummond, scientific adviser to the Ministry of Food, is giving a series of four lectures to the **Royal Institution.** The first of these lectures will be on **November 23,** at 5.15 p.m., and the others are arranged to take place on the three following Tuesdays at the same time. In order of their presentation the titles of the talks will be "Food Production," "Food Research," "Food Technology" and "Food Education."

The fourth group of fuel economy lectures arranged by the **Association of British Chemical Manufacturers** will be given in the lecture hall of the Geological Society, Burlington House, Piccadilly, London, W.1, on **November 24,** at 2.30 p.m. The lecturers will be Mr. J. Malley, of Mirrlees Watson Co., Ltd., and Mr. H. E. Dall, of George Kent, Ltd., speaking, respectively, on "Economics of Methods of Producing Vacua" and "Steam Metering for Process Plant." Non-members who wish to attend should notify Mr. A. J. Holden, A.B.C.M., 166 Piccadilly, W.1.

The Manchester branch of the **Institute of Fuel** will meet in the Engineers' Club, Albert Square, Manchester, at 3 p.m. on **November 25,** to hear an address by the Institute's president, Dr. E. W. Smith, C.B.E., on "The Aims and Objects of the Institute in relation to the National Fuel Position."

Dr. H. J. Emeléus will be speaking on "Modern Technique in Inorganic Chemistry" at the joint meeting of the Manchester sections of the **Royal Institute of Chemistry** and the **Chemical Society,** on **November 25.** The lecture will begin at 5.30 p.m. in the chemical lecture theatre of Manchester University.

At the **Royal Institution,** on **November 26,** at 5 p.m., the chairman of the Food Investigation Board, Sir Joseph Barcroft, C.B.E, F.R.S., will lecture on "The Preservation of Foods by Drying."

At the meeting of the **Textile Institute** (Midlands section) at the College of Art and Technology, Leicester, on **November 27,** at 3 p.m., a joint lecture by Dr. C. M. Blow, A.I.C., and Mr. W. Knight, A.I.R.I., on "Textile Fibres and Rubber as Associated Materials for Manufacture," will be delivered.

The Leeds Area Section of the **Royal Institute of Chemistry** holds its annual general meeting at the University on **November 29,** at 6.30 p.m. The president, Professor Alexander Findlay, will attend.

The annual general meeting of the **Electrodepositors' Technical Society,** to be held at the Northampton Polytechnic, St. John Street Clerkenwell, E.C.1, on **November 29,** at 5.30 p.m., will be followed by a "Brains Trust" session, with the president acting as question master. Members are invited to send questions on any aspect of electrodeposition to the hon. secretary.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH CELANESE, LTD., Torquay. (M., 20/11/43.)—October 28, £200,000 5½ per cent. debenture stock, part of an amount already registered. *£3,108,761. February 3, 1943.

Satisfactions

ASHWORTH & PARKER, LTD., Bury, steam engine makers. (M.S., 20/11/43.) Satisfaction October 15, of debentures registered August 10, 1935.

BRITISH CELANESE, LTD., Torquay. (M.S., 20/11/43.)—Satisfaction October 28, of debenture stock registered June 21, 1934, to the extent of £2,572,761 (balance).

METALS PENETRATIONS, LTD., London, S.E. (M.S., 20/11/43.)—Satisfaction, November 1, £1000, registered May 18, 1938.

Company News

Lawes Chemical Co., Ltd., have declared a dividend of 6 per cent. (same) for the year ended June 30.

Wade Potteries, Ltd., are paying one year's dividend on account of arrears on the 6 per cent. cumulative preference shares for the year ended April 1, 1939. Net profit of the two subsidiary companies, for the year to July 31 last, was £6363.

Major & Co., Ltd., announce a profit, for the year to March 31, of £10,698, to which is added E.P.T. adjustment £5100, making £15,978 (£33,573). Dividend for the year is 6 per cent. (nil); forward, £19,388 (£13,468).

Reckitt & Sons, Ltd., are paying an interim ordinary dividend of 10 per cent. (following one of 5 per cent. already paid). As announced last July, the distribution of interims has been changed from the long-standing practice of making three 5 per cent. interim payments followed by a final of 6¼ per cent. plus a bonus of 1¼ per cent.

The International Nickel Co. of Canada announces a net profit of U.S. $23,205,451 ($24,377,124) for the nine months to September 30, equivalent to $1.49 ($1.57) on common stock. For the three months to September 30 the profit was equivalent to 45c. per share (52c.), but the directors have concluded that the present year should be completed without changing the 50c. quarterly rate of dividend.

New Companies Registered

Crewe Electro Plating, Ltd. (383,469).—Private company. Capital: £1000 in 1000 shares of £1 each. To carry on the business of electro, nickel and chromium platers, etc. Directors: J. Wilson; P. G. McMeaken; W. Micklewright. Registered office: Farber Street, Crewe.

Chemical and Allied Stocks and Shares

OWING to the small volume of business in the stock and share markets, any selling of industrial and other securities which developed has tended to have a more pronounced influence on values. The reaction became widespread, although selling pressure was not heavy, and market sentiment continued to be dominated by uncertainty as to the position during the eventual change-over to peace-time working. Shares which have been favoured on hopes of improved earnings after the war reacted sharply in some cases, partly because it is realised that dividend prospects after the war will depend, to a large extent, on whether E.P.T. is abolished or materially reduced. On the other hand, in many cases the lower prices were attributed mainly to the small demand in evidence. At the time of writing, however, the reduced prices are tending to attract buyers. British Funds remained a relatively firm feature.

Turner & Newall were 74s. 3d. compared with 74s. 9d. a week ago, and Murex declined from 95s. to 92s. 6d. On the other hand, Borax Consolidated deferred at 35s. 6d. maintained last week's level. Imperial Chemical eased from 37s. 9d. to 37s. 6d., but were relatively steady, because the yield is not unattractive, and the prevailing view is that there seem good prospects of the dividend remaining on an 8 per cent. basis. B. Laporte were quoted at 78s. 9d. xd., and W. J. Bush at 60s. Elsewhere, Burt Boulton continued to hold the improvement to 21s. which followed the dividend announcement. The recent rally of Triplex Glass 10s. ordinary shares was followed by a reaction from 38s. to 36s. 9d. Forsters Glass 10s. ordinary changed hands up to the improved level of 30s. De La Rue ordinary again showed sharp movements, and at the time of writing, have declined to 156s. 3d. British Industrial Plastics 2s. shares were 6s. 9d., and Erinoid 10s. 4½d. Elsewhere, Dunlop Rubber came more under the influence of the market trend, and were 37s. 6d. compared with 39s. 3d. a week ago. British Oxygen dropped at the beginning of the week to 74s., but later rallied to 75s. The units of the Distillers Co. declined from 87s. 6d. to 86s. 3d., United Molasses from 31s. 3d. to 30s. 9d., and General Refractories were 15s. 6d. British Match were maintained at 38s. 9d. Lever & Unilever at 35s. 6d. were 1s. down on balance, and Lever N.V. declined by a similar amount to 32s. 9d. British Aluminium were 46s. 3d. compared with 47s. With few exceptions, however, the decline in share values has been small when compared with the extent of the rise shown earlier in the year. Lawes Chemical 10s. ordinary were around 13s.

Associated Cement were 60s. compared with 61s. a week ago, and British Plaster Board 27s. 9d. compared with 28s. 6d. A reaction from 48s. to 47s. 6d. was shown in Babcock & Wilcox. Allied Ironfounders were a few pence down at 47s. 7½d. Dorman Long subsequently showed a better tendency, but at the time of writing are lower on balance for the week, standing at 27s. 3d. compared with 28s. 4½d. Guest Keen were 33s. 3d., compared with 34s. a week ago, and United Steel 25s. compared with 25s. 4½d. Stewarts & Lloyds moved back from 51s. 3d. to 50s. 6d., and Tube Investments from 91s. to 90s. 4½d. Staveley ordinary were 51s. 6d. compared with 52s. 3d. Elsewhere, Greeff-Chemicals 5s. ordinary were 7s. 3d., and William Blythe 3s. shares changed hands at 9s. Dealings around 99¾ were shown in Johnson Matthey 4 per cent. debentures.

Fluctuations continued in British Celanese, which were 28s. compared with 31s. a week ago, the disposition being to await the financial results and any further information regarding the company's new products. Courtaulds were 50s. compared with 51s., and Bradford Dyers 20s. as against 20s. 9d. a week ago. In accordance with the prevailing tendency, Boots Drug moved back from 41s. 3d. to 40s. 9d.

Sangers were 23s. 6d., and aided by the financial results, Timothy Whites remained at 33s. 3d. British Drug Houses were 24s. The decline in oil shares subsequently tended to attract buyers.

British Chemical Prices

Market Reports

BUYING on the London chemicals market during the past week has been on a fair scale, with a good inquiry for contract renewals. Deliveries under existing commitments are proceeding along steady lines and are reported to be well up to schedule. Firm price conditions obtain pretty well throughout the market. There has been little change of importance in either the potash section or the soda products section and, as in most other directions, offers are finding a ready outlet. Textile chemicals have perhaps been a little more active than of late and a sustained demand continues for solvents and plasticisers. No outstanding changes fall to be recorded in the coal-tar products market during the past week and values continue strong.

MANCHESTER.—Little change of any consequence has occurred in trading conditions on the Manchester chemical market during the past week. In virtually all sections quotations maintain a very firm front and no indication of easiness is apparent in any section. Contract deliveries to the textile and allied industries, as well as to other leading users, are going forward steadily and consumers are not hesitating to replace commitments as the need arises. The past week has witnessed a fair amount of inquiry for a wide range of products and a moderate volume of actual new business has been reported.

GLASGOW.—In the Scottish heavy chemical trade the position is unchanged from last week, home business remaining steady. Export trade is still rather restricted. Prices keep very firm.

Latest Oil Prices

LONDON.—November 15.—For the period ending November 27 (January 8 for refined oils), per ton, naked, ex mill, works or refinery, and subject to additional charges according to package: LINSEED OIL, crude, £50. RAPESEED OIL, crude, £60. COTTONSEED OIL, crude, £52 2s. 6d.; washed, £55 5s.; refined edible, £57; refined deodorised, £58. COCONUT OIL, crude, £49; refined deodorised, £49; refined hardened deodorised, £53. PALM KERNEL OIL, crude, £48 10s.; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £55; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £56 10s.; refined deodorised, £58; refined hardened deodorised, £62 to £63. WHALE OIL, crude hardened, 42 deg., £51 10s.; refined hardened, 46/48 deg., £52 10s. ACID OILS—Groundnut, £40; soya, £38; coconut and palm-kernel, £43 10s. ROSIN, 30s. 6d. to 45s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

Strike at Widnes

Recognition of C.W.U. Involved

A STRIKE of short duration, but one which is described as the first major strike in Widnes for 20 years, affected the works of Thomas Bolton & Sons, Ltd., last week from midnight on Monday to noon on Wednesday. It has been officially stated that the matter at issue was a claim by employees who had recently become members of the Chemical Workers' Union for recognition by the company of that union and the shop stewards, whereas the company found itself unable to agree with that request owing to a long-standing agreement with the National Union of General and Municipal Workers. The C.W.U. has pointed out that a ballot on the question of recognition resulted in a favourable majority of 305 to 4. The strike was carried out in a disciplined manner, no "incidents" occurred, and on Wednesday morning Mr. Bob Edwards, North-West organiser of the C.W.U., urged a return to work, because without such a return the Ministry of Labour would not intervene, and any decision was certain to favour the cause of the C.W.U. Although there were a number of dissentients, it was agreed to return to work in the afternoon.

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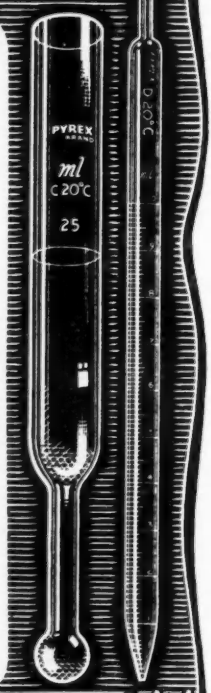

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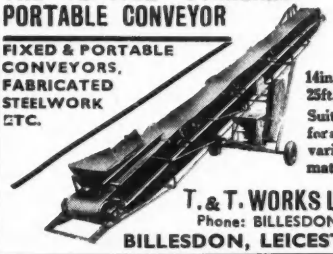
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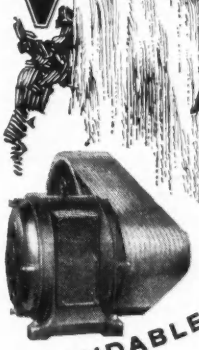

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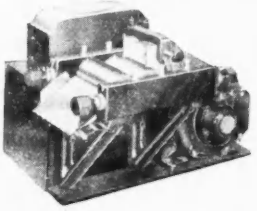

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